The Nymphs of *Synlestes tropicus* Tillyard, *Chorismagrion risi* Morton, *Oristicta filicicola* Tillyard and *Lestoidea conjuncta* Tillyard: With Description of the Female of the Latter and Further Notes on the Male

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(Figs. 1-4.)

Systematists working on the Order ODONATA are continually confronted with problems regarding the correct placing of aberrant species, towards which, a knowledge of the nymphs would be of great assistance. This is especially true in regard to archaic forms such as *Hemiphlebia*, *Chorismagrion* and *Lestoidea*, the two former of which may be correctly described as living fossils. The nymph of *Hemiphlebia mirabilis* Selys was discovered and described by Tillyard in 1927 at Alexandra, Victoria, and a study of its wing-tracheation revolutionised our ideas on this subject. Tillyard, in a letter to Mr. Morton, dated December 2nd, 1927, writes: "I am not sure that this nymph does not deal a deadly blow to the whole Comstock-Needham concept of wing-tracheation preceding veins. If the tracheae follow the veins in the cases mentioned (intercalated veins), why should not the *original* trachea have followed the *original* veins? This would explain the puzzle of the incomplete and irregular tracheation of the Trichoptera as against the complete and regular tracheation of the Lepidoptera, which are surely a more highly specialised Order? It would also explain the condition of the tracheation in Mayfly nymphs."

It has now been the good fortune of my colleague Mr. R. Dobson to discover the nymphs of *Chorismagrion risi* Morton and *Lestoidea conjuncta* Tillyard; the first in considerable numbers, the latter from a single exuviae with the newly emerged imago perched on it, so that there could be no doubt about the identification; Mr. Dobson took this nymph some years ago but in the absence of the imago was unable to identify it. On the same short expedition, he took also nymphs of *Synlestes tropicus* Tillyard and *Oristicta filicicola* Tillyard, both of which were hitherto unknown.

Our sole knowledge of the nymph of *Chorismagrion* until now, was contained in a letter which I received from Dr. Tillyard some years ago, and as this has never been published, I reproduce it in full: "You will be glad to learn that the search for the larva of *Chorismagrion* has at last been crowned with success. While using part of the Royal Society grant, for a visit to the Pre-Cambrian and Cambrian beds at Mt. Isa, N.W. Queensland, I spent ten days on the Atherton Tableland. It rained solidly the whole time, but I got on the original locality of Dr. Mjoberg at Dinner Creek, near Tully Falls, and dredged the creek for two miles in the dense jungle in bitterly cold rain squalls. I thought I had nine *Chorismagrion* larvae as a result, but on dissection I find that eight belong to the primitive *Synlestes albicauda* Tillyard and only one, about one-third grown, belongs to *Chorismagrion*. Unfortunately this larva had only one gill left, and this, by some unfortunate chance, was thrown out while being cleared for mounting. However, I have a sketch of it, and as it is exactly like the gill of *S. albicauda*, except for a broad band of brown on it, the loss does not matter much. The gizzard and mask are definitely Synlestine, but slightly more primitive, and the antennae have not got that specialised lengthening of the first segment. It is a relief to secure this important larva and to know that my placing of this genus so close to *Synlestes* is justified. I hope to send a paper for publication on the larvae of Australian Synlestidae to Ent. Soc. London before long."

Tillyard did not survive long enough to write this paper for all that was found among his correspondence was the capitation of the proposed paper,

and a reference to the London Society elicited the reply that no such paper had been received. It may be said now that from an examination of Mr. Dobson's material, it is certain that Tillyard had the correct nymph and that the genus is, as he thought, very closely related to the *Synlestes*.

Dr. Tillyard's knowledge of *Lestoidea conjuncta* Till., was limited to the holotype male, now in the British Museum (Natural History); he did not know the female or the nymph but from the venation, he thought that the genus linked up the Lestidae with the Protoneuridae. He was not so fortunate in his conjectures about this queer species, for Mr. Dobson's nymph clearly shows that it is unrelated closely to either of these families but related to the more advanced Amphipterygidae.

Of the Isostictinae, Tillyard figured but did not describe nymphs of *Neosticta canescens* Tillyard and *Isosticta simplex* Martin, but the figures were too small and without much detail; the latter appears to be very similar to that of *Oristicta filicicola* Tillyard, described in this paper.

Finally, Tillyard stated in a letter that the only Synlestine which had been described was the nymph of *Synlestes weyersi* Selys, but all that I have been able to trace of such a description is the small figure of the nymph given in his "Biology of Dragonflies" and the figure of the labium, so that for purposes of comparison with *Chorismagrion*. I have had to employ the nymph of *Synlestes tropicus* discovered by Mr. Dobson.

DESCRIPTION OF NYMPHS.

1. *Synlestes tropicus* Tillyard, 1917 (fig. 1).

Total length 21 mm. Caudal gills 5 mm. Labial mask 3.5 mm. Hind-femora 5.5 mm.

Head broader than deep with the frons projecting, broadly truncate; antennae very long, with short scape but elongate pedicel about three times the length of scape, 3rd segment nearly twice the length of pedicel, remaining segments of distalia shortening progressively; bases of pedicel and 3rd segment blackish. Vertex marked with black and only the median ocellus distinct, the lateral ill-defined; occiput bulging, rounded or globular, traversed by a blackish stripe and black posteriorly. Labial mask kite-shaped, entirely without setae, lateral lobes robust, with moderately long movable hook and two stout teeth at apex, the inner one the longer, strongly curved; inner border finely dentate. Medial lobe with irregular border, its central portion projecting truncately and deeply and finely cleft and with its border finely dentate. Prothorax rectangular, the shoulders squared, broadly black anteriorly, from which two stripes run backwards and are continued very sinuously on to the dorsum of synthorax. Wing-pads extending nearly to the apical end of segment 4 of abdomen and with a broad oblique sooty black band traversing their breadth about the middle. Legs long and slim, strongly ridged and very minutely spined; femora with two black rings and the distal end blackish; tibiae with two black rings, one subbasal, the other subapical. Abdomen long and tapered, rounded, pale with black markings, two parallel stripes on middorsum enclosing oval pale spots, and two sub-dorsal stripes, the innermost of which is interrupted before the end of each segment and dilates apically. Caudal gills paddle-shaped, very obtuse at apices, the median somewhat shorter than the lateral ones. All are held vertically (not horizontally as in *Austrolestes*) and closely opposed; a broad black band extends from near the base but falls short of the conspicuously pale apex.

Habitat: Mervyn Creek, Kuranda, N. Queensland, 5.X.55, collected by R. Dobson.

2. *Chorismagrion risi* Morton, 1914 (fig. 2).

Total length 17 mm. Caudal gills 2.75 mm. Labial mask 2.5 mm. Hind-femora 4 mm. Abdomen about 10 mm.

Head wider than deep, frons rounded, the labium just showing from beneath the head as viewed dorsally; antennae very long, scape short, pedicel nearly four times as long, 3rd segment about one-third shorter than pedicel, remaining segments progressively shorter; segments 3 to 5 black except at apices. Vertex marbled with brownish grey, the ocelli outlined in this colour; occiput shallowly concave, bulging and globular behind eyes where it is finely spined. Labial mask kite-shaped, deep black in colour except the lobes; lateral lobes with a long robust movable hook and terminating in two stout teeth, the innermost the longer and acuminate at apex; medial lobe projecting as two rounded lobes separated by a deep but closed fissure, the free border finely dentate; no setae present on any part of labium. Prothorax oval, marked with a parallel pair of short longitudinal middorsal stripes of black, as well as its sides. Thorax bulky, blackish except on middorsum and medial borders (fig. 2). Legs rather long and slender, ridged but without armature save some bordering minute spines. Coxae, base and apex of femora as well as two medial rings black, tibiae with two black rings. Abdomen cylindrical, tapering, pale on dorsum and blackish beneath and with a narrow blackish band extending along each side from end to end. Caudal gills broadly oval, shorter than in *Synlestes* and rather obtusely pointed at apices, the dorsal gill hardly shorter than the lateral; all gills black except a conspicuously pale yellowish apex. The gills are held vertically and closely opposed as in *Synlestes*.

Habitat: Mervyn Creek, Kuranda, N. Queensland, 3.X.55, collected by R. Dobson. Several nymphs and exuviae.

3. *Oristicta filicicola* Tillyard, 1913 (fig. 3).

Total length 16 mm. Caudal gills 5.0-5.5 mm. Labial mask 3 mm. Hind femora 3.5 mm.

Head pentagonal, slightly wider than deep; eyes dark, prominent; antennae rather long, scape and pedicel of even length, both short, 3rd segment nearly three times longer than the pedicel, 4th segment slimmer but at least as long as the 3rd, remaining segments of distalia progressively smaller, 3rd and 4th segments with a medial black band, less marked on the segments of distalia. Face and vertex grey, enclosing the paler ocelli and a short stripe running medially from the labrum; occiput dark at centre and sides, with the pale longitudinal stripe of the vertex running posteriorly on to the prothorax and base of synthorax; the sides of prothorax irregular and with an obtuse tubercle at their middle. Thorax robust but short, the bases of wing-pads invading it medially. Wing-pads pea-pod shaped, narrow, elongate and parallel, the bases striped longitudinally and the subbasal portions sharply defined paler. Legs rather long, slim, only minutely spined along the ridges, all femora and tibiae with three black rings. Abdomen cylindrical, tapering to end, blackish above and beneath but the segmental apical borders and a narrow middorsal line pale; apical borders of segments coarsely hairy. Caudal gills markedly elongated and flattened, held vertically and closely opposed, constricted at base, the sides parallel, constricted again at the node which is situated at the junctions of the middle and apical thirds, the apical portion leaf-like, shaped like the head of a spear and fringed throughout along the sides with long, closely-set hairs. Labial mask kite-shaped, closely resembling the Platycnemidine type, lateral lobes with short movable hook and two robust teeth at apex, the outermost the longer and sharply curved, 5 long setae on each lobe; middle lobe produced, cone-like but without cleft, bordered with fine dentations, 4 setae in a straight line at base of the lobe as in genus *Platycnemis* (Platycnemididae).

Habitat: Tully, N. Queensland, 9.X.55, 2 nymphs and 2 exuviae examined, collected by R. Dobson. The shape and formation of the labial mask suggests that the Isostictinae are related to the Platycnemididae, which hitherto, have been unknown from Australian limits, although well represented in the neighbouring continent of New Guinea.

4. *Lestoidea conjuncta* Tillyard, 1913 (fig. 4).

Total length 15 mm. Caudal gills 2.5 mm. Labial mask 3 mm. Hind femora 4 mm.

Head subtrapezoidal, wider than deep, the frons and labrum forming a rather flat convexity, the latter fringed with short vibrissae, the labium projecting squarely from beneath it. Antennae with elongate scape and a pedicel twice as long (the rest of the segments have been lost). To the outer side of the base of the antennae and on the outer parts of the occiput is a field of small stout spines. Prothorax and thorax bulky as compared with the very short abdomen, both coated with similar spines as seen on the head, especially on the shoulders. Wingpads large and flattened, extending nearly to the apical border of segment 5 of abdomen. Legs moderately long, markedly depressed, the femora with a row of small spines on the medial border. Abdomen depressed, very short, and tapered but slightly towards the anal end. Caudal gills saccoid in character, triquetral in section with the inner surface flattened, the outer rounded; dorsal gill but slightly shorter than the lateral, all terminating in a long tail-like spine which is thickly coated with long coarse hairs. Labial mask Gomphine-like, flattened and squared, lateral lobes robust, with moderately long movable hook and two robust apical teeth, the outer acuminate, the inner truncate, the inner border of the lobe finely dentate, the outer with a tuft of long hairs at its base, without any setae; middle lobe produced, deeply emarginate at its centre where is a fine short cleft; its borders finely dentate; no setae present at its base.

Habitat: Mervyn Creek, Kuranda, N. Queensland, 3.X.55. A single exuviae taken along with the freshly emerged imago by R. Dobson. This is a short stout nymph of a uniform dark brown colouring without perceptible markings. Its shape, the fringed labrum, the Gomphine-like labial mask and the saccoid gills all agree with the same characters in the Amphipterygidae, so that it is evident that *Lestoidea* is a more recent type than the Lestidae or the Protoneuridae, an annectent of which Tillyard thought the genus to be. The shape of the discoidal cell, the elongate pterostigma, the straight nature of the accessory intercalaries and the advanced recession of the veins IRiii and Riv+v are all compatible with *Lestoidea* being a reduced type of Amphipterygine. Tillyard described *L. conjuncta* from the holotype male which was a discoloured specimen; Lieftinck afterwards described another male but this also was largely defective in its colouring; the female has never been described. Lastly some inaccuracies also occurred regarding the venational details and measurements of the imago, which may now be corrected.

Lestoidea conjuncta Tillyard.

Male. Abdomen 28-29 mm. Hindwing 21 mm.

The anal vein, which Tillyard said was entirely absent, is present in all specimens although vestigial in character, sometimes as a small chitinous triangle at the lower end of the cubital vein (Ac) but much more usually as a distinct small triangular cell at this point.

Head: labium brownish yellow, labrum pale creamy glossy white with a black anterior border; anteclypeus black, genae and a narrow stripe crossing the postclypeus pale creamy yellow, frons and rest of head mat black but with a small point of yellow on the outer side of the ocellar space each side. Prothorax entirely dull ochreous, posterior lobe as described by myself (1953). Thorax ochreous or a warm light orange brown marked with black as follows: a moderately narrow middorsal stripe, a small point on the upper end of the humeral suture, a large duplicated (dumb-bell-shaped) spot above the middle coxae, a rather diffuse stripe on the postero-lateral suture, sometimes deficient above, and a similar diffuse stripe on the lower border of metepimeron. Beneath paler ochreous with a sharply defined linear spot of black on each side of pectus. Legs blackish brown or black on extensor surfaces, pale on the flexor. Abdomen black, segment 1 pale

yellowish save for a black dorsal triangular marking with its apex directed apically, segment 2 with parallel subdorsal longitudinal yellow stripes not extending to either end of segment, segments 3 to 5 or 6 with small paired basal spots of white. Anal appendages black, as described by Lieftinck (1951).

Female. Abdomen 26 mm. Hindwing 22 mm.

Coloured and marked similarly to the male but the lateral thoracic stripes perhaps better defined and more complete. In some specimens the ground colour of the thorax, especially laterally, is a beautiful lilaceous blue; this does not appear to be due to age but a true variation. Anal appendages black, shortly conical. Ovipositor robust, extending slightly beyond end of abdomen. (Postnodal veins in both sexes vary from 14 to 16 in the forewings, and 11 to 13, usually 12 in the hind.)

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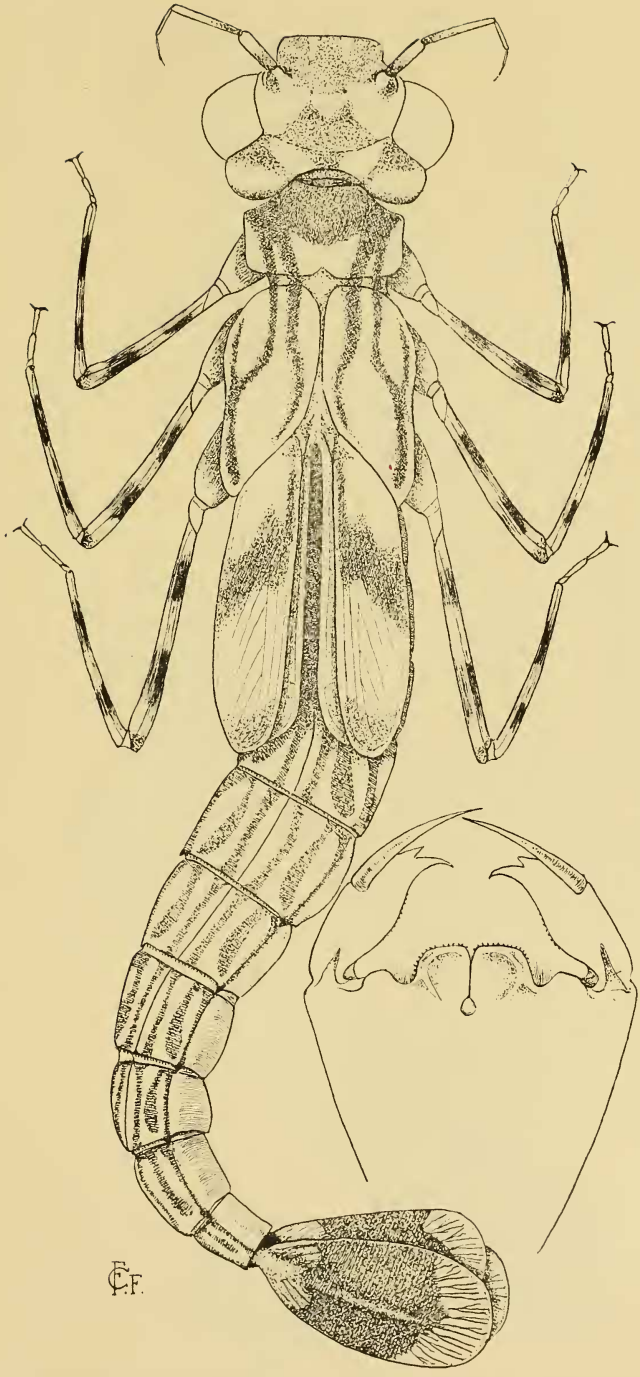

Fig. 1: Adult nymph of *Synlestes tropicus* Tillyard.

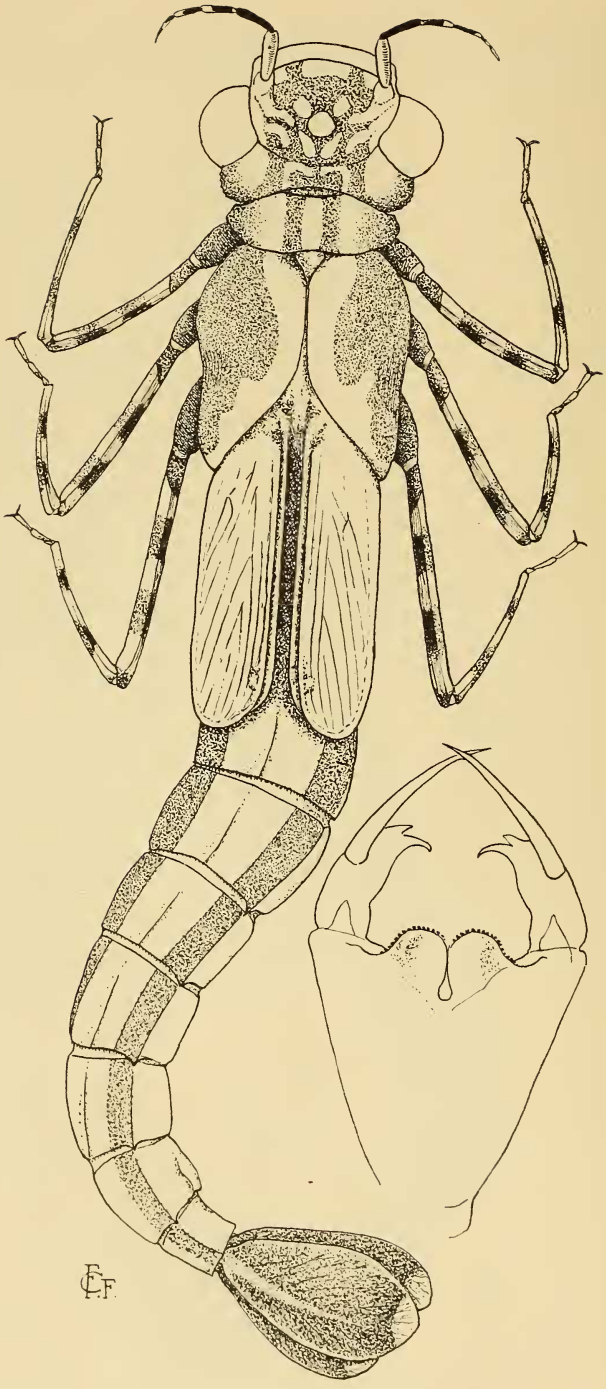

Fig. 2: Adult nymph of *Chorismagrion risi* Morton.

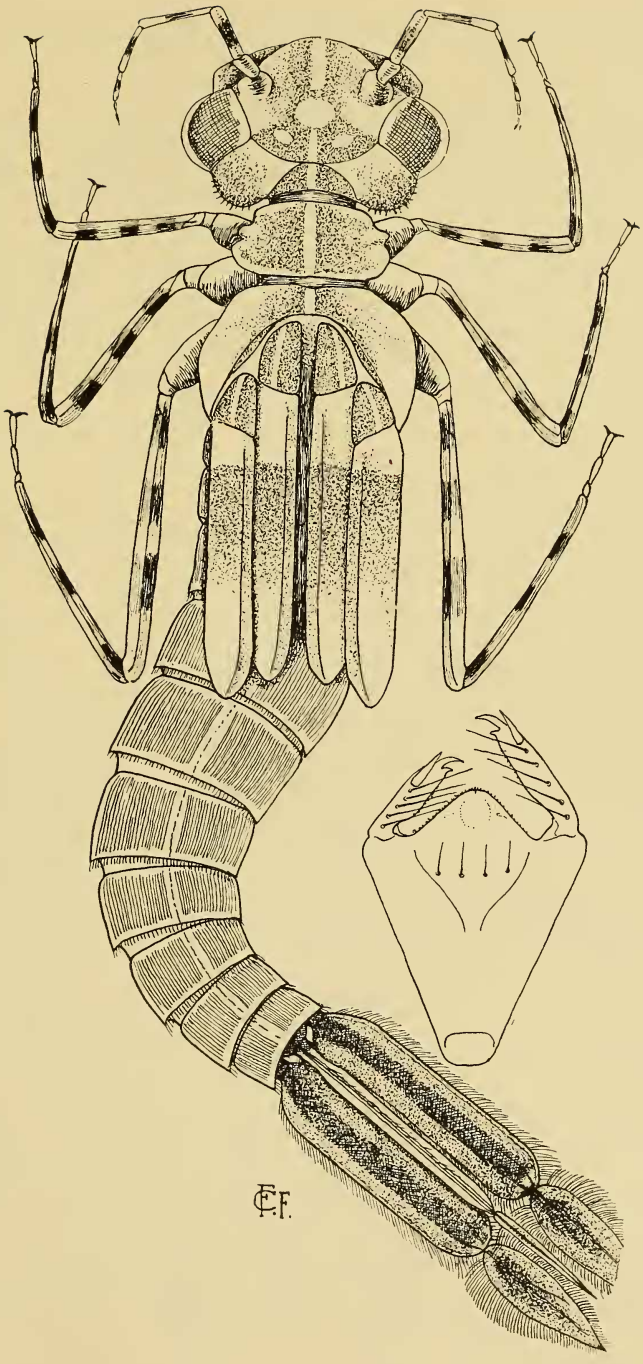

Fig. 3: Adult nymph of *Oristicta filicicola* Tillyard. (The lateral gills are shown rotated outward in order to show the outlines to advantage; ordinarily they are held in close apposition to the dorsal gill.)

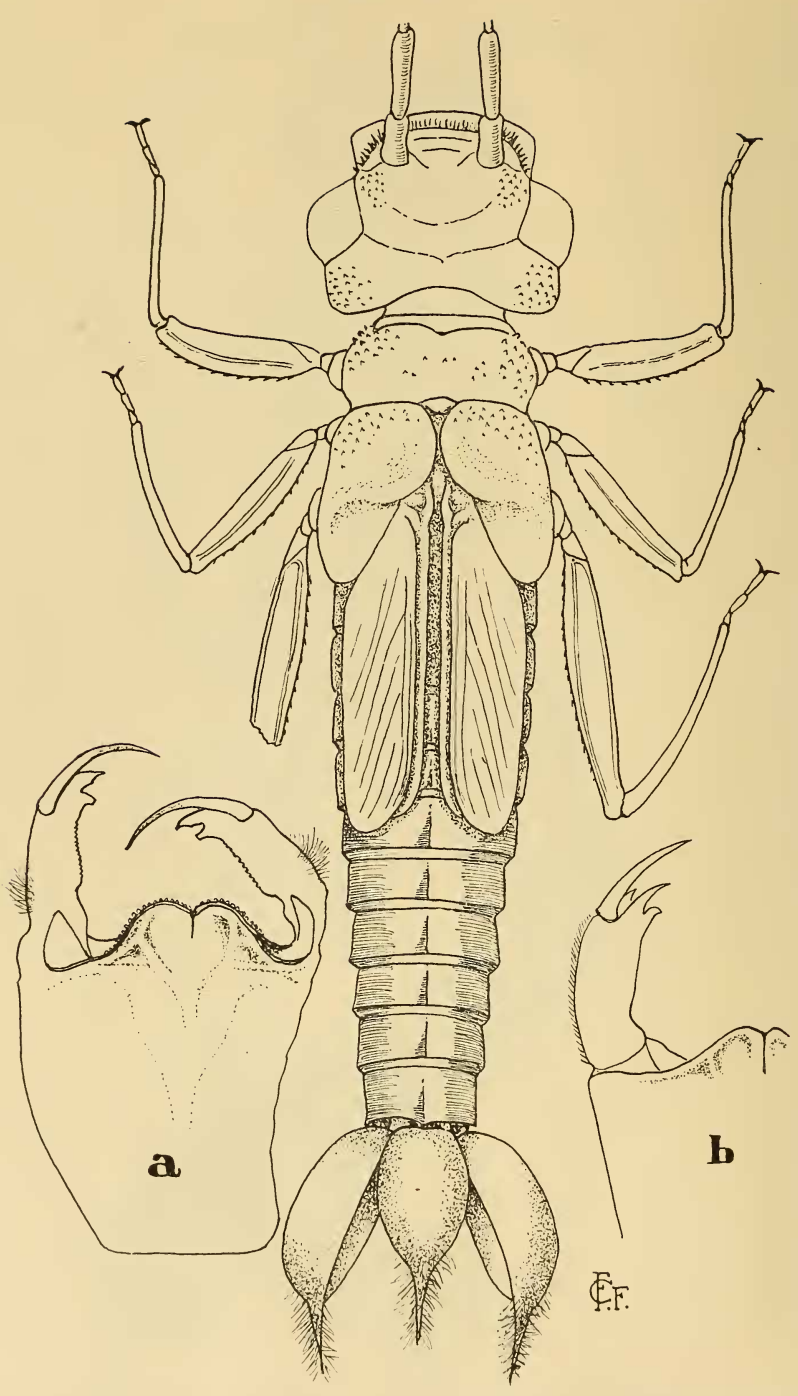

Fig. 4: Adult nymph of *Lestoidea conjuncta* Tillyard.
a. Labial mask of the same species.
b. Labial mask of *Diphlebia lestoides* Selys, 1853, for comparison with the last species.